IN THE CLAIMS

Please amend the claims as follows:

1. (Currently Amended) An OFDM signal transmitted from an OFDM transmitter using a plurality of transmit antennas, the OFDM signal being adapted for channel estimation for channels associated with said transmit antennas by the inclusion of orthogonal training sequence data in the signal from each said antenna, said training sequence data being derived from substantially orthogonal training sequences of length K for each said transmit antenna, said orthogonal training sequences being derived from a single MIMO training symbol and constructed such that a minimum required sequence length K needed to determine a channel estimate for at least one channel associated with each said transmit antenna is linearly dependent upon the number of said transmit antennas.

2. (Original) An OFDM signal as claimed in claim 1 wherein said orthogonal training sequences are constructed based upon sequences of values

$$X^m_k = \exp(j\, 2\pi\, k\, m\, L/K)$$

where k indexes a value in a said sequence, m indexes a transmit antenna, L is a positive integer, and K is the length of a said sequence.

3. (Original) An OFDM signal as claimed in claim 2 wherein said orthogonal training sequences are based upon scrambled versions of said sequences of values X^m_k.

4. (Original) An OFDM signal as claimed in claim 3 wherein portions of said OFDM signal including said training sequence data have a peak-to-average power ratio of substantially unity.

5. (Original) An OFDM signal as claimed in claim 2 wherein said index k indexes subcarriers of said OFDM signal.

6. (Original) An OFDM signal as claimed in claim 2 wherein said index k indexes OFDM symbols of said OFDM subcarrier.

7. (Original) An OFDM signal as claimed in claim 2 wherein L is equal to the length of a cyclic extension of said OFDM signal in sample periods.

8. (Original) An OFDM signal including training sequence data for channel estimation for a plurality of transmit antennas, said training sequence data being based upon training sequences of length K defined by values of exp (j 2π k m L/K) where k indexes a value in a said sequence, m indexes a transmit antenna and L is a positive integer.

9. (Currently Amended) An OFDM transmitter using a plurality of transmit antennas and configured to transmit an OFDM signal, the OFDM signal being adapted for channel estimation for channels associated with said transmit antennas by the inclusion of orthogonal training sequence data in the signal from each said antenna, said training sequence data being derived from substantially orthogonal training sequences of length K for each said transmit antenna, said orthogonal training sequences being derived from a single MIMO training symbol and constructed such that a minimum required sequence length K needed to determine a channel estimate for at least one channel associated with each said transmit antenna is linearly dependent upon the number of said transmit antennas.

10. (Original) An OFDM data transmission system comprising the transmitter of claim 9 and an OFDM receiver configured to receive the OFDM signal.

11. (Original) An OFDM transmitter using a plurality of transmit antennas and configured to transmit an OFDM signal including training sequence data for channel estimation for said plurality of transmit antennas, said training sequence data being based upon training sequences of length K defined by values of exp (j 2π k m L/K) where k indexes a value in a said sequence, m indexes a transmit antenna and L is a positive integer.

12. (Original) An OFDM data transmission system comprising the transmitter of claim 11 and an OFDM receiver configured to receive the OFDM signal.

13. (Currently Amended) A data carrier carrying training sequence data for use with an OFDM transmitter using a plurality of transmit antennas, said training sequence data being derived from substantially orthogonal training sequences of length K for each said transmit antenna, said orthogonal training sequences being derived from a single MIMO training symbol and constructed such that a minimum required sequence length K needed to determine a channel estimate for at least one channel associated with each said transmit antenna is linearly dependent upon the number of said transmit antennas.

14. (Original) A data carrier for use with an OFDM transmitter using a plurality of transmit antennas, said data carrier carrying training sequence for channel estimation for said plurality of transmit antennas, said training sequence data being based upon training sequences of length K defined by values of exp (j 2π k m L/K) where k indexes a value in a said sequence, m indexes a transmit antenna and L is a positive integer.

15. (Currently Amended) An OFDM transmitter having a plurality of transmit antennas, said OFDM transmitter being configured to transmit, from each said transmit antenna, training sequence data based upon a training sequence, said training sequences upon which said training sequence data for said antennas is based being derived from a single MIMO training symbol and constructed such that:

i) said training sequences are substantially mutually orthogonal;

ii) said training sequences allow a receiver to determine a channel estimate for a channel associated with each said transmit antenna; and

iii) a minimum length of each said training sequence needed to satisfy (ii) is substantially linearly dependent upon the number of transmit antennas.

16. (Original) An OFDM transmitter as claimed in claim 15 wherein said training sequence data is based upon scrambled versions of said training sequences.

17. (Original) An OFDM transmitter as claimed in claim 16 wherein said scrambled versions of said training sequences are selected to provide a peak-to-average ratio of transmitted power of approximately one.

18. (Original) An OFDM transmitter as claimed in claim 15 configured to transmit an OFDM signal with K subcarriers.

19. (Original) An OFDM transmitter having a plurality of transmit antennas, said OFDM transmitter being configured to transmit, from each said transmit antenna, training sequence data based upon a training sequence having values

$$X^m_k = \exp(j\,2\pi\,k\,m\,L/K)$$

where k indexes a value in a sequence of length K, m indexes a said transmit antenna, and L is a positive integer.

20. (Original) An OFDM transmitter as claimed in claim 19 wherein said training sequence data is based upon scrambled versions of said training sequences.

21. (Original) An OFDM transmitter as claimed in claim 20 wherein said scrambled versions of said training sequences are selected to provide a peak-to-average ratio of transmitted power of approximately one.

22. (Original) An OFDM transmitter as claimed in claim 19 configured to transmit an OFDM signal with K subcarriers.

23. (Original) Processor control code and training sequence data to, when running, implement the OFDM transmitter of any one of claims 9, 11, 15 or 19.

24. (Original) A carrier carrying processor control code and training sequence data to, when running, implement the OFDM transmitter of any one of claims 9, 11, 15 or 19.

25. (Currently Amended) An OFDM transmitter configured to transmit an OFDM signal from a plurality of transmit antennas, the OFDM transmitter comprising:

a data memory storing training sequence data for each of said plurality of antennas;

an instruction memory storing processor implementable instructions; and

a processor coupled to said data memory and to said instruction memory to read and process said training sequence data in accordance with said instructions, said instructions comprising instructions for controlling the processor to:

read said training sequence data for each antenna;

inverse Fourier transform said training sequence data for each antenna;

provide a cyclic extension for said Fourier transformed data to generate output data for each antenna; and

provide said output data to at least one digital-to-analogue converter for transmission; and

wherein said training sequence data for a said antenna derived from a single MIMO training symbol and comprises data derived from a sequence of values

$$X^m_k = \exp(j\, 2\pi\, k\, m\, L/K)$$

where m indexes the said antenna, k indexes values in the sequence, L is a positive integer, and wherein the sequence has a length K.

26. (Original) An OFDM transmitter as claimed in claim 25 wherein said training sequence data is based upon a scrambled sequence of values $c_k X^m_k$ where c_k denotes a value in a scramble sequence indexed by k.

27. (Original) A data carrier carrying the training sequence data for each antenna of claim 25.

28. (Original) A data carrier as claimed in claim 27 further comprising said processor implementable instructions.

29. (Currently Amended) A method of providing an OFDM signal from an OFDM transmitter having a plurality of transmit antennas with training sequence data for determining a channel estimate for each of said transmit antennas, the method comprising:

inserting training sequence data for each said transmit antenna into said OFDM signal, said training sequence data being derived from orthogonal training sequences of length K for each said antenna, said orthogonal training sequences being derived from a single MIMO training symbol and constructed such that a minimum required sequence length K needed to determine a channel estimate for at least one channel associated with each said transmit antenna is linearly dependent upon the number of said transmit antennas.

30. (Original) A method as claimed in claim 29 further comprising retrieving said training sequence data from a training sequence data store.

31. (Original) A method as claimed in claim 29, wherein said orthogonal training sequences are based upon sequences of values of length K

$$X^m_k = \exp(j\, 2\pi\, k\, m\, L/K)$$

where k indexes a value in a said sequence, m indexes a transmit antenna and L is a positive integer.

32. (Original) A method as claim in claim 31 wherein said orthogonal training sequences are based upon scrambled versions of said sequences of values X^m_k.

33. (Original) A method as claimed in claim 32 wherein portions of said OFDM signal including said training sequence data have a peak-to-average power ratio of substantially unity.

34. (Original) A data carrier carrying training sequence data for each said transmit antenna as recited in claim 29.